

ferred from cars to boats; thawing by steam expensive, also causes delays, which can be averted by advance information of freezing temperature.—Practical application at Duluth.

**DISTRIBUTION OF FORECASTS BY TELEPHONE.** by Dr. G. M. Chappel: List of telephone companies in Iowa.—Plan of cooperation.—Practical results.

**PRACTICAL RULES FOR FORECASTING FLOOD-CREST STAGES FOR CAIRO, ILL.,** by Mr. P. H. Smyth: Difficulty of crest-stage forecasting.—Character of the data upon which forecasts are based.—Possibility of predicting the intensity of floods two or three months in advance of their occurrence.—Method of applying the tabulated data.—Brief history of the flood at Cairo in the spring of 1897.—Time of flood crests from Cincinnati, Chattanooga, Nashville, and St. Louis to Cairo.

**THE COLUMBIA RIVER,** by Mr. E. A. Beals: Its discovery and commercial importance.—Drainage basin, extent and character.—Precipitation over watershed.—River stages, including The Dalles Hydrograph.—Causes of floods, their frequency and duration.

**SOME DIURNAL PERIODICITIES IN THE CLIMATIC FACTORS AT BALTIMORE,** by Dr. O. L. Fassig: A diurnal period will be shown for temperature, pressure, humidity and vapor tension, rainfall (frequency and amount), wind velocity and direction, cloudiness and sunshine, and thunderstorms and atmospheric electricity.—Discussion based on series of ten years of hourly observations made at the Baltimore station.—Diurnal periods graphically shown by means of a system of "isopleths."

**INSTRUCTION AND RESEARCH BY WEATHER BUREAU OFFICIALS,** by Prof. Cleveland Abbe: In this address the author shows what has been done for meteorological education during the past thirty years by the Bureau or through its influence.—He examines the present condition of this subject in this country and considers its future prospects.—He shows that progress in forecasting means not only education in the physical sciences but research, and illustrates this by recent examples.—Finally, he shows what research means, how it is to be fostered, and especially how it can be carried on at a well-equipped central meteorological observatory like that at Mount Weather.

**PHENOLOGICAL OBSERVATIONS AT WAUSEON, OHIO,** by Mr. J. Warren Smith: Temperature and precipitation at Wauseon, Ohio, since 1876, and their relation to the blossoming of fruit trees.—Average yield per acre of principal farm fruits and crops. (This paper will be accompanied by charts.)

**A STUDY OF THE RAINFALL ON THE WEST FLORIDA COAST,** by Mr. B. Bunnemeyer: Summary of rainfall data for twenty-four years, with charts.—Ratio of day rainstorms to night rainstorms.—Hours of greatest and of least frequency of showers.

**CLIMATOLOGY OF PORTO RICO,** by Mr. W. H. Alexander: Topography.—Temperature.—Rainfall.—Humidity.—Prevailing winds, etc.

**MONTHLY STATEMENT OF AVERAGES FOR RURAL PRESS,** by Mr. W. S. Belden: Form similar to 1079—Meteorological, based on data from all observation stations within section, to be prepared at section centers.—Such data for ten years or more now available.—Data should be concise and plainly stated.—Extreme values for important agricultural districts to be stated.—Time of issue and use of by weekly newspapers and newspaper unions.—Result of experiments.

**IRREGULARITIES IN FROST AND TEMPERATURE IN NEIGHBORING LOCALITIES,** by Dr. I. M. Cline: Marked variations of temperature in different localities in immediate neighborhoods.—Occurrence of "frost patches," or the irregular effect where small areas scattered over fields have suffered much greater damage than other parts of the same field.—Character and color of soils and their influence on insolation and radiation have much to do with the occurrence of frost and explain the "frost patches."

**FORMER CONVENTIONS OF WEATHER BUREAU OFFICIALS,** by Mr. James Berry: Brief mention of former conventions and of the benefits resulting therefrom.

#### WIRELESS TELEGRAPHY.

The Department of Agriculture, through the Weather Bureau, was one of the first of the Government Departments to take up, systematically, experimentation in problems concerned with the development of wireless telegraphy. By this action research into the physical problems concerned in transmitting messages through the medium of ether waves was greatly stimulated in this country. Probably one of the best, if not the best, instruments anywhere made for the receiving of wireless messages had its inception in the experimental work of the Weather Bureau.

Recently a Board, to consider the whole problem of wireless telegraphy and the relation of the Government thereto, was appointed by the President. Its conclusions and recommendations follow:

#### CONCLUSIONS.

The conclusions of the Board are—

That the science of wireless telegraphy has been advanced by the able and persistent work of the Signal Corps of the Army and the Weather Bureau of the Department of Agriculture, as well as by the experimental work of the Navy Department.

That wireless telegraphy is of paramount interest to the Government through the Navy Department, and that its use by the Signal Corps of the Army for communication between military posts of the Army and other necessary links will be necessary both in peace and war, and that such use shall be unrestricted. When interference seems probable between stations of the Navy and War Departments, the question involved shall be mutually settled by representatives of the two Departments;

That coastwise wireless telegraphy is not a necessity for the work of the Weather Bureau of the Department of Agriculture, provided that the necessary meteorological data for that Department can be collected by the stations of the Navy Department from ships at sea and by them sent to the Weather Bureau of the Department of Agriculture;

That the maintenance of a complete coastwise system of wireless telegraphy by the Navy Department is necessary for the efficient and economical management of the fleets of the United States in time of peace and their efficient maneuvering in time of war;

That the best results can be obtained from stations under the jurisdiction of one Department of the Government only, and that representatives of more than one Department should not be quartered at any station;

And finally the Board concludes that the Government must take the necessary steps to regulate the establishment of commercial wireless-telegraph stations among the States and between nations.

#### RECOMMENDATIONS.

In order that the above conclusions may be carried into effect, the Board recommends—

That the Signal Corps of the Army be authorized under its chief to establish from time to time such wireless stations as he may deem necessary, and that they do not interfere with the coastwise wireless-telegraphy system of the Government under control of the Navy Department; and further, that the Chief Signal Officer be requested to inform the Navy Department what stations of its systems may be utilized to transmit messages for the Signal Corps or other bureaus of the War Department, and that representatives of the Signal Corps of the Army and Bureau of Equipment of the Navy Department be at once requested to draw up such rules as will insure the efficient and harmonious carrying into effect of the above recommendations.

That the necessary steps be taken to have the Weather Bureau of the Department of Agriculture turn over to the Navy Department all coastwise wireless-telegraph apparatus now under its control, and such material as it may have in its possession which can be utilized by the Bureau of Equipment of the Navy Department and that proper transfers of funds for this purpose be made;

That the Weather Bureau of the Department of Agriculture furnish to the Hydrographic Office of the Navy, and to the naval wireless-telegraph stations, or to other portions of the public service, such meteorological data as it or they may desire at no cost to them;

That the Department of Agriculture shall continue the work of its meteorological vessel-reporting and storm-warning stations, as now constituted and provided for by law, and continue the control of seacoast telegraph systems, except wireless systems;

That the necessary steps be taken that the Navy Department may equip and install a complete coastwise wireless-telegraph system covering the entire coasts of the United States, its insular possessions, and the Canal Zone in Panama;

That the Navy Department be directed to receive from the Signal Corps of the Army, at such points as may be requested by the Chief Signal Officer of the Army, all messages for army posts within their radii, and transmit them under such rules as may be agreed upon by the representatives of the Signal Corps and Bureau of Equipment, without cost to the Signal Corps of the Army;

That all meteorological reports from vessels of war or commerce or other sailing craft, now being forwarded direct to the Hydrographic Office of the Navy, shall be forwarded direct to the Weather Bureau, and the control of ocean meteorology be transferred to the Department of Agriculture, which already has ample law for doing this work;

That the estimates for the support of the Hydrographic Office of the Navy, or any other office of the Navy, for the next and succeeding fiscal years, do not contain any provision for the making of ocean forecasts, or for the publication of meteorological data, other than such as may be needed by the Hydrographer of the Navy for use on the pilot and other charts, which data shall be furnished by and credited to the Weather Bureau;

That it is the opinion of this Board that no meteorological work need or should be done by any portion of the Navy for the purpose of publication, or for the making of forecasts or storm warnings; that all such duties, being purely civil, should devolve upon the Weather Bureau of the Department of Agriculture in accordance with the organic act creating that Bureau;

That the wireless station of the Navy Department shall, without charge to the Agricultural Department, receive and promptly transmit to the ocean or to islands, or to other places where the information can be made useful, the storm warnings of the Weather Bureau;

That the Navy Department shall request all vessels having the use of its wireless stations for the receipt of messages, to take daily meteorological observations of the weather when within communicating range and to transmit such observations to the Weather Bureau, through naval wire-

less stations, at least once daily, and transmit observations oftener when there is a marked change in the barometer; and that there shall be no charge against the Agricultural Department for these observations or for the transmission thereof;

That representatives of the Department of Agriculture and the Bureau of Equipment of the Navy Department be directed to prepare the necessary rules for the harmonious and efficient carrying on of the above recommendations.

We recommend that as fast as the naval wireless-telegraph stations are put in operation the Navy Department be directed to receive and transmit through these stations, free of charge, all wireless messages to or from ships at sea, provided such stations do not come in competition with commercial stations, until such time as Congress may enact the necessary legislation governing this subject.

In asking for legislation on this point, the Board desires to invite attention to the fact that where wireless stations are needed for the merchant marine, as a rule the Navy will also require them. The Board believes it to be in the interest not only of governmental but public economy and efficiency to permit the naval stations to handle the public service, for in the present state of the art but one station is desirable for the public interests in such places. As the needs of the Navy are paramount on account of the problem of national defence, private stations should not be allowed to locate to the disadvantage of the former. Moreover, there is at present no public need for multiplication of stations at these points.

It is admitted, however, that there may be special cases where private stations can serve a useful purpose, and the Board believes that the Department of Commerce and Labor should have the duty of issuing licenses in such cases under such regulations as will prevent interference with stations necessary to the national defence. All private stations in the interior of the country should also be under supervision of the Department of Commerce and Labor.

This method of placing private stations under full Government supervision is desirable in order to regulate them for their mutual and the public welfare, as well as from considerations of national defence. Aside from the necessity of providing rules for the practical operation of such stations, it seems desirable that there should be some wholesome supervision of them to prevent the exploitation of speculative schemes based on a public misconception of the art.

It is believed that invention and private enterprise should be encouraged in every legitimate way, and it is the policy of the Navy Department to do this. It has the means of assisting inventors that no other Department has, and it believes that in order for it to lead the navies of the world in this matter, which is of great importance to the national defence, every reasonable facility should be given inventors, while at the same time it is working out the problems of the application of their inventions to its requirements in times of peace and war.

To prevent the control of wireless telegraphy by monopolies or trusts, the Board deems it essential that any legislation on this subject should place the supervision of it in the Department of Commerce and Labor.

Because international questions may arise, due to the fact that the use of wireless-telegraph stations in our own possessions may affect the use of similar stations in foreign countries, it is desirable for the Congress to enact legislation which will enable the Government properly to handle such cases; a failure to do so may seriously embarrass the Government at some future time.

It is thought that the legislation recommended in placing private stations under the supervision of the Department of Commerce and Labor will also cover this case.

In conclusion, the Board deems it essential that the Executive take such action as in his judgment seems wise to prevent the erection of private wireless-telegraph stations where they may interfere with the naval or military operations of the Government until legislation may be had by Congress on this subject.

Appended hereto are two extracts from the Revised Statutes, marked "W" and "X," which related to the operation of Government telegraph lines; also a decision of the Supreme Court, marked "Y," and the final protocol of the Preliminary Conference of Wireless Telegraph, held in Berlin in August, 1903, marked "Z."<sup>2</sup>

Very respectfully,

R. D. EVANS,  
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Representing the Department of Commerce and Labor.  
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Rear-Admiral, U. S. Navy,  
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# MONTHLY WEATHER REVIEW AND WORK OF THE EDITOR.

Prof. Cleveland Abbe's time has been wholly occupied in collecting and preparing material for the MONTHLY WEATHER REVIEW and in preparing and delivering a course of lectures on various problems in physical meteorology. The MONTHLY WEATHER REVIEW has appeared as promptly as practicable, about six weeks after the close of the month whose name it bears. The salient features of the principal articles published in the Reviews for June, 1903, to June, 1904, are worthy of review in this report. From notes furnished by Professor Abbe the following comments are made:

W. N. Shaw: "La lune mange les nuages." A note on the thermal relations of floating clouds (June, 1903). In this the author, who is the chief of the Meteorological Office of London, shows graphically the effect of a slow descent of the air in evaporating the clouds, a phenomenon that occurs regularly every night.

Prof. C. F. Marvin: "The Weather Bureau seismograph" (June, 1903). This describes the apparatus now established at the Weather Bureau and the sources of error in its records. This apparatus was invented by Omori, of Japan, and manufactured by Bosch, of Strasburg. This article has been highly praised in Europe and reprinted by the manufacturer for general use. During the last year a number of earthquake waves have been recorded by this seismograph, and the records have been published in the WEATHER REVIEW. Professor Marvin states that it needs to be supplemented by another smaller apparatus specially designed for the detection of short, minute waves. The present one is designed for the long, slow waves that frequently run several times entirely around the earth before their energy is spent. The Omori apparatus is said to be much more sensitive than the photographic horizontal pendulum of Milne, which is employed at Baltimore, Toronto, and Victoria, but it is apparently not so sensitive as the magnetic needle supported on a quartz fiber, as in the magnetic observatory at Cheltenham, England. The records of the Milne seismograph at certain stations are said to have demonstrated that the areas of high and low atmospheric pressure produce perceptible tiltings of the earth's surface, but the Omori instrument at Washington does not show this, possibly because its location in the basement of the main building does not isolate it sufficiently well from local changes due to temperature and the passage of wagons and individuals.

Harvey N. Davis: "Observations of solar radiation with the Ångström pyrheliometer at Providence, R. I." (June, 1903).

H. H. Kimball: "Observations with the Ångström pyrheliometer" (July, 1903). These reports were referred to in my previous annual report as having been presented and about to be published. Since that time they have been published in full, and have been followed by a general discussion of the whole subject of the sudden variation in the quantity of heat received at the earth's surface that occurred during 1902-3. Some have maintained that this change is due primarily to a change in the amount or quantity of heat that issues from the sun itself. Others, with more plausibility, maintain that it is due to a sudden accession of moisture, haze, or dust in our own atmosphere, and that the changes in the solar radiation or absorption are too small to have caused this change as measured at the earth. Mr. Kimball has continued his own series of observations during the past year at Washington, and if his work is maintained for several years it will doubtless give us additional information. It is very important that the bolograph records secured by Professor Langley should be duplicated by corresponding work at some very dry station having much clear sky, such as are found in our Rocky Mountain and Pacific coast regions.

W. N. Shaw: "On curves representing the paths of air in a special type of traveling storm" (July, 1903). The author deals with a special assumed case in which the speed of the air is assumed to be uniform over the whole area of the storm, although the direction varies from point to point. The isobars are assumed to be true circles, and the wind directions are tangential to them; the center describes a straight path with the same speed as the wind. Many of the conclusions drawn from these assumptions agree with the observations of actual storms. He postpones the consideration of the influence of ascending and descending currents to his next paper, "General circulation of the atmosphere." This has already been received and published in the REVIEW for June, 1904.

D. T. MacDougal: "Soil temperatures and vegetation" (August, 1903). This is a study in the relation between climate and plant growth, and represents the results of several years of work. It would appear that the temperature of the soil is more important than the temperature of the air.

C. G. Knott: "Solar radiation and earth temperatures" (October, 1903). A novel feature of this paper consists in the computation of the accumulation of heat, or the total quantity of heat in the soil at any time of year, as obtained by integrating the expression for the quantity present in each successive layer of soil. The computation shows that at the beginning of September there is a maximum quantity of heat below the surface of the ground and at the beginning of March there is a minimum quantity. At Edinburgh, Scotland, the difference amounts to over 1200 units per square centimeter, or nearly 8000 units to the square inch.

<sup>2</sup> The papers referred to in this paragraph are omitted from this report.